



UNITED STATES NAVY

Medical News Letter

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No. 9

Surgeons General of the Past

(The eleventh in a series of brief biographies)

The eleventh Chief of the Bureau and seventh Surgeon General, Philip Skinner Wales, was born in Maryland 26 February 1834, and appointed from that state as an Assistant Surgeon in the Navy on 7 August 1856. His first service was in what was then called the East India Squadron on the steam frigate Mississippi. During the early years of the Civil War he was aboard the steamer Water Witch. In 1863 he was at the Norfolk Naval Hospital and later on the 7-gun steamer Fort Jackson with blockade squadrons in the South Atlantic and western Gulf of Mexico. Doctor Wales was promoted to Surgeon on 12 October 1861 and Medical Inspector on 30 June 1873. He was employed on special duty from 1874 to 1878, probably in preparing a naval medical history of the Civil War. (Congress did not appropriate funds for publication and the manuscript has not been located.) His term of office as Surgeon General extended from 20 August 1879 to 27 January 1884. He founded the Museum of Naval Hygiene which, when later united with the naval laboratory and Department of Instruction at Brooklyn, became the forerunner of the present Naval Medical School for the postgraduate instruction of naval officers. During his term, a subordinate embezzled large sums of money by placing blank requisitions (among copies to be signed) before him for signature. Doctor Wales was courtmartialed for "neglect of duty and culpable inefficiency in the performance of duty." Although he was found guilty, the Secretary of the Navy declared there was no evidence of any corrupt act or motive involving any breach of personal integrity on Doctor Wales' part. In fact he was partly responsible for discovering the frauds, and his testimony against the culprits helped bring about their indictment. It is interesting to note that the court martial proceedings were probably the first in the Navy to be typewritten. Medical Director Wales lived in Paris after 1900 and died there on 15 September 1906.



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Surgeon General

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The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

CAFE CORONARY—SUCCESSFUL TREATMENT

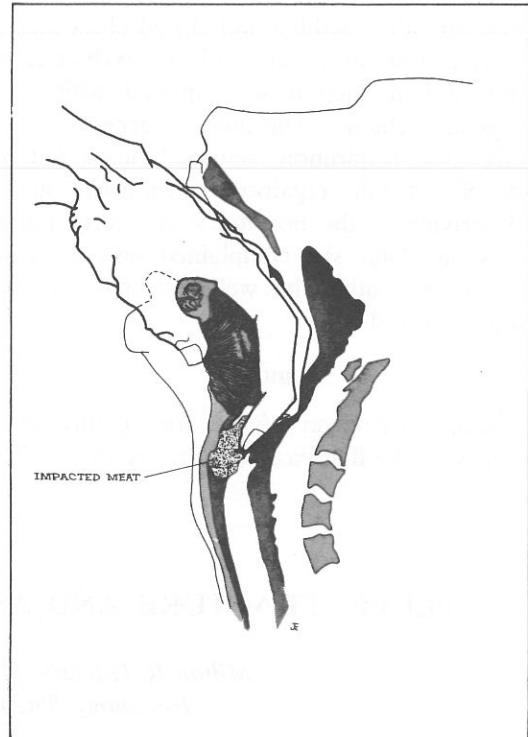
CAPT S. G. Kramer MC USN and LCDR G. I. Goldstein MC USNR,
Naval Hospital, Newport, Rhode Island.*

Cafe coronary is an engaging term not easily forgotten. Further, it is quite descriptive in that it resembles acute fatal coronary thrombosis. Death, however, is from aspiration of a large piece of meat. In nearly all cases the airway obstruction is at the larynx. R. K. Haugen¹ who named the entity has reported autopsy findings in nine cases. It is believed to be a rather common event and many physicians know of a case which occurred at a barbecue, convention, home or elsewhere. Wee and Lyman² have reported a fatal case occurring in a hospital dining room. No successfully treated cases have been reported.

As Haugen pointed out a rather constant but tragic sequence of events occurs. Beginning, usually, in convivial surroundings, the victim aspirates a large piece of meat such as steak, rare roast beef, lobster or the like, literally swallowing it into the larynx. He is unable to communicate his plight and often makes no sign whatsoever of his difficulty. Collapse and death rapidly follows, the true nature of the emergency being unsuspected.

The successful outcome in the following two cases is therefore of interest. The second case is less typical but is sufficiently similar to be included.

Case 1.—A 70 year old retired Army officer was enjoying a beef dinner with friends at an officers club, November 8, 1964, when he was noticed to slump in his chair and become unresponsive. A few moments earlier he had been animated and talkative. He made no sign to attract help. When first examined, pulse and respiration were absent and he was intensely cyanotic. There was a wide staring gaze and, from all appearances death had occurred. Treatment was, however, immediately begun. He was placed supine and a large bolus of meat (6 x 7 cm.) was removed from the larynx (Fig. 1). This



required a vigorous effort, since the patient's upper incisors restricted the back of the hand. Mouth-to-mouth breathing and closed chest cardiac massage were started. A slow pulse returned in about one minute and weak respiratory efforts followed in about two minutes. He required respiratory assistance for several more minutes as the pulse improved. Time between arrest and onset of treatment was estimated at four minutes. He remained completely unconscious for thirty minutes, meanwhile being removed to a hospital.** At one hour, although confused, he could speak a little. He subsequently made a complete recovery. Electrocardiogram showed transient ischemia without infarction.

Case 2.***—A 41 year old woman choked on a large piece of roast beef at a buffet, December 11,

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The opinions or assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

**U.S. Naval Hospital, Portsmouth, Virginia, Case #0151988.

***This case was treated by Captain D. A. Mills MC USN.

1964. She hurriedly tried to swallow in order to speak to a friend. The meat, which was rather gristly, would neither go down nor could she bring it up. She walked a short distance to a rest room trying the while to dislodge the meat. She was unable to do so and collapsed. She later stated she was terrified and knew she was dying.

Examination one to two minutes after loss of consciousness revealed absent pulses. Skin color could not be reliably estimated because of subdued lighting but there was no respiratory effort. A brief search of the mouth was non-rewarding, and mouth-to-mouth breathing and closed chest massage was started. Initially no air could be exchanged and mouth-to-mouth suction was applied with subsequent good exchange. The pulse returned in twenty seconds and respiration returned in about one minute. She steadily regained consciousness and recalled arriving at the hospital some thirty minutes later. A day later she complained only of a sore throat and was otherwise well. The piece of meat was not recovered.

Comment

Immediate suspicion of the true nature of the emergency in the first case led directly to a success-

ful outcome. The second case is believed to represent a transient airway obstruction caused by a large piece of meat lodged in the hypo-pharynx and overlapping the airway. Tracheotomy was not required in either case.

Summary

The mode of death in Cafe Coronary is asphyxia from a large piece of meat. This can be removed manually through the mouth. If manual efforts are unsuccessful, tracheotomy might be done if a good surgical blade is immediately available. In that event it is further necessary to maintain the tracheal aperture, provide ventilation, and dislodge or remove any obstruction encountered. External cardiac massage and assisted respiration will likely be required in all cases.

A distress call where people gather to eat should be answered promptly as it is very likely a Cafe Coronary.

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1. Haugen, R. K.: The Cafe Coronary, *JAMA* 186: 142-143, Oct. 12, 1963.
2. Wee, George C. and Lyman, Edward H.: Food Asphyxiation Simulating Coronary Disease, *Missouri Medicine* 61:449-450, June 1964.

PELVIC FRACTURE AND ASSOCIATED SOFT-TISSUE TRAUMA*

Milton R. Gilchrist MD and Donald H. Peterson MD,
Radiology 88(2):278-280, February 1967.

Fractures of the pelvis are always associated with some degree of soft-tissue trauma. The importance of the early treatment of both fracture and soft tissue has been emphasized in the literature. While treatment is abetted by perception of soft-tissue damage on the initial roentgenogram, only too often the glaringly apparent fracture distracts and holds the radiologist's attention.

Material

One hundred and ninety-two fractures of the pelvis were seen at the St. Paul-Ramsey Hospital, St. Paul, Minn., over a period of four years, 1961 to 1965. All patients were considered. The sex dis-

tribution was approximately even: 93 males and 99 females. The age groupings and deaths, by 10-year intervals, are shown in Table 1.

Classification of Accidents

Accident Type: The type of accident can be divided into three categories: (a) fall, (b) collision, (c) other (Table 2). Further, the patient involved is classified as pedestrian, rider in vehicle, worker on vehicle, other. A heading for intoxication, which may seem a deviation, certainly should be included in any accident survey. Vehicles have been defined to include car, bus, truck, motorcycle, scooter, and bicycle. "Collision" means (a) person outside of the vehicle being struck by it or (b) those within the vehicle striking the inside of the vehicle. The "other" category, with only 2 patients, includes

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avulsion of the ischial tuberosity in a high school athlete and a gunshot wound of the pubis.

Seventy percent of the pelvic fractures were incurred by pedestrians. As a consequence, the conclusion has been reached that it is dangerous to be a pedestrian at any age.

Cause of Death: Thirty-six deaths (18.5 percent) resulted from the trauma. Only 2 of the fatally injured did not have multiple injuries or complications; in these 2, the cause of death could not be pinpointed but each had a large retroperitoneal hemorrhage. Table 3 lists the associated injuries, complications, and probable cause of death. It will be noted that 25 of the 36 patients to die had severe abdominal retroperitoneal hemorrhage and 9, rupture of the urethra, bladder, or both. Similar findings have been emphasized by other authors.

Table 1
CLASSIFICATION BY AGE OF 192 CASES OF FRACTURED PELVIS

Age (yr.)	No. of Patients	No. of Deaths
0-10	7	1
11-20	20	3
21-30	23	0
31-40	9	0
41-50	26	4
51-60	24	8
61-70	36	8
71-80	17	5
81+	30	7
TOTALS	192	36

Table 2
ACCIDENT TYPES (INCLUDING DEATHS) (192 CASES)

	Fall	Died	Collision	Died	Other	Intoxication	Deaths (Total)
Pedestrian	56(30%)	6	78(40%)	19			25
Rider in vehicle			52(27%)			{ 40(21%)	11
Worker on vehicle			4(2%)				0
Other							
Avulsion					1(0.5%)		0
Gunshot					1(0.5%)		0

Table 3
COMPLICATIONS AND PROBABLE CAUSE OF DEATH IN PELVIC FRACTURES

Embolus	2
Pneumonia	3
Cranial injury	11(30%)
Hemorrhage (abdominal)	25(70%)
Heart complication	3
Ruptured urethra or bladder	9(25%)

Type of Pelvic Fracture: The types of pelvic fracture are listed in Table 4.

Other Injuries: Many cases of multiple injuries were found in both the living and the deceased groups. Table 5 compares these two groups of pa-

Table 4
TYPE OF PELVIC FRACTURE*
(192 PATIENTS)

	No. of Deaths	No. of Patients Living	Total
Pubis	24	130	154
Ilium	4	31	35
Acetabulum	5	37	42
Ischium	4	14	18

* In case of multiple pelvic fractures, all areas are listed.

tients as to their injuries. It is evident that the pelvic fracture and associated soft-tissue trauma directly contributed to the morbidity and even mortality in these cases.

Table 5
MULTIPLE TYPES OF TRAUMA ASSOCIATED WITH
THE PELVIC TRAUMA

Area of Injury	No. of Deceased Patients	No. of Living Patients	Type of Trauma
Chest	9(25%)	21(11%)	Fracture, pneumothorax, atelectasis
Head	11(30%)	14(7%)	Fracture, hemorrhage, contusions
Heart	3(8%)	1(0.5%)	Coronary artery occlusion
Embolus	1(3%)	1(0.5%)	Fat-fracture
Abdomen	2(6%)	3(1.5%)	Ruptured viscus
Multiple fractures	28(80%)	44(23%)	Other than pelvic
Bladder, urethra	9(25%)	7(4%)	Rupture
Hemorrhage	24(70%)	11(6%)	Retroperitoneal in pelvis

Roentgen Studies

Method of Filming: Usually, the only available film was an anteroposterior roentgenogram of the pelvis. No lateral views were obtained. Any follow-up study would include two angulation views of the pelvis with a tube tilt of 35° cephalad and 15° caudad. Small, previously undetected fractures occasionally appeared.

Interpretation: On review of the interpretations of the original films, it was found that ordinarily no mention of soft-tissue trauma was made unless special contrast agents had been employed. The roentgenograms were reviewed with the purpose of detecting a soft-tissue mass or a shift of the urinary bladder, either of which would presumably indicate a retroperitoneal hematoma, extravasated urine, or both.

While the radiologist, when aware of the importance of the soft-tissue trauma, may overcall, he does tend to be correct one-third of the time and directs attention to this area (Table 6).

Table 6
FINDINGS ON REVIEW OF ORIGINAL FILMS*

	Positive (%)	Over- call (%)	Under- call (%)
Shift of urinary bladder	63	32	5
Soft-tissue pelvic mass	60	35	5

* Positive = Mass and/or shift of bladder, proved true at operation, autopsy, or contrast agent study.

Overcall = Mass and/or shift of bladder, proved not true at operation or autopsy.

Undercall = Mass and/or shift of bladder not diagnosed and proved present at operation or autopsy.

The detection or suspicion of this soft-tissue mass will aid the surgeon in early reduction of bleeding or correction of bladder or urethra rupture, thus reducing morbidity and mortality.

Pelvic Fracture—Type Associated

In 92 percent of the cases with a mass density in the pelvis or a shift of the urinary bladder, there was a fracture of the pubic rami. In approximately one-half these cases, there was only a pubic ramus fracture. These findings have been well documented in the literature. The fractures did not have to be severe in appearance to be associated with shift of the bladder or soft-tissue mass density. Also, the opposite factors apply in that a pelvic fracture extremely severe in appearance may result in no discernible soft-tissue trauma. In the remaining 8 percent of cases of soft-tissue changes, there was acetabular but no pubic fracture. None of the cases with only iliac fracture or sacro-iliac separation demonstrated any mass or bladder shift.

Conclusions and Summary

In a review of 192 cases, pelvic fractures were found to be more often associated with pedestrian-vehicle collision than with any other kind of accident. It is dangerous to be a pedestrian at any age. Not as many pelvic fractures were associated with intoxication as had previously been suspected.

Injury that includes pelvic fracture is more apt to terminate in death if there is associated pelvic retroperitoneal hemorrhage. A soft-tissue mass in the pelvis or shift of the urinary bladder may indicate retroperitoneal hemorrhage or bladder or urethra

rupture. Such findings can often be defined on the early pelvic roentgenograms even when they are not clinically suspected. Also, in fracture of the pubic rami, regardless of severity, coexisting retroperitoneal hemorrhage should be immediately suspected and commented upon by the radiologist.

The early detection and correction of retroperi-

toneal pelvic hemorrhage and/or rupture of the urinary bladder or urethra facilitates the treatment of other injuries and reduces morbidity and mortality.

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(The references may be seen in the original article.)

THE USE OF THE ELECTROENCEPHALOGRAM IN THE EVALUATION OF HEAD TRAUMA

Vincent P. Perlo MD* Boston, New Eng J Med 276(2):104-105, Jan 12, 1967.

The electroencephalogram plays an important part in the neurologic evaluation of patients who have suffered head trauma. There is, in general, a correlation between the severity of head trauma and degree of electroencephalographic abnormality subsequently found. When the electroencephalogram is abnormal after a head injury, clinical improvement is usually accompanied by return of cerebral electric activity toward normal. When significant head trauma is associated with a normal electroencephalographic pattern soon after injury, the possibility of serious brain damage is remote. A normal electroencephalogram allows the clinician to feel secure when he is faced with distressing complaints of headache, dizziness, insomnia, personality change and myriad other symptoms of the post-traumatic syndrome. On the other hand, the electroencephalogram provides an index of the degree of irreversible brain damage caused by head trauma and alerts the physician to the possible development of post-traumatic epilepsy.

Closed and Open Head Injuries

Closed head injury may result in varying degrees of trauma to the brain and meninges. Different levels of impairment of function are paralleled by electric patterns represented by the electroencephalogram. *Cerebral concussion*, the mildest degree of significant head injury, is associated usually with a normal post-traumatic electroencephalogram. Severe concussion can produce slow-wave abnormalities in the pattern. These changes may be diffuse or focal. Serial tracings in such patients usually show

gradual disappearance of the slow waves and return to normal of the brain-wave pattern over a period of weeks or months.

Brain contusion, laceration or hemorrhage may occur as a result of closed or open head injury. This severe degree of cerebral trauma is accompanied by marked abnormalities in the electroencephalogram. High-voltage slow waves appear diffusely and sharp or spike waves may arise from areas of focal brain damage. In some patients with gross cerebral damage after trauma a marked degree of electroencephalographic abnormality may persist indefinitely, despite apparent clinical improvement or recovery. Head injury resulting in focal damage to the cerebral cortex may lead to *post-traumatic epilepsy*. The frequency of post-traumatic epilepsy is directly related to the severity of the brain injury. The highest incidence follows open head trauma. The convulsive disorder may begin shortly after the brain injury or may appear months or years later. In most cases post-traumatic seizures appear within two years of a severe head trauma, but occasionally the interval may be considerably longer. Careful electroencephalographic study of patients with focal brain injury usually reveals the presence of a focal discharge from the region of damaged cerebral cortex. The essential abnormality is a cortical cicatrix surrounded by an epileptogenic focus arising from damaged cortical neurons. Sleep-activated electroencephalography is of special value in revealing focal spike discharges from the cerebral cortex after trauma. In a high percentage of patients with this type of brain-wave abnormality post-traumatic epilepsy will develop.

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Subdural hematoma is accompanied by focal electroencephalographic abnormalities in approximately 90 percent of cases. A normal brain-wave test obtained within several weeks of head trauma will be good evidence against the presence of an indolent subdural hematoma. In addition, if the serial pattern after head injury is that of initial abnormality and subsequent improvement, the chance of a subdural hematoma is unlikely. Conversely, a worsening pattern, especially if the abnormality becomes focal, would make subdural hematoma a serious diagnostic consideration. Chronic subdural hematoma can be a diagnostic possibility for weeks, months or even years after head injury, and electroencephalography is of great value in the evaluation of this diagnosis.

Epidural hematoma presents a clinical problem that is telescoped into hours or days. This neurosurgical emergency often leads to operation before an electroencephalogram can be obtained. In the cases in which there is time for brain-wave study the finding of a focal abnormality over the site of the hematoma is the rule.

Post-Traumatic Syndrome

The electroencephalogram is of considerable value in the assessment of patients with so-called post-traumatic syndrome. These patients suffer incapacitating headaches, dizziness and nervousness after head trauma that can be classified in most cases as mild concussion. Symptoms may persist for months or years and plague the physician who attempts to follow the patient from onset to recovery. Quite often litigation assumes a major role, and the interminable waiting for cure or end result before the case is settled aggravates the host of symptoms that comprise this syndrome. If the electroencephalogram is entirely normal shortly after the head trauma and remains normal some weeks or months hence, the diagnosis of post-traumatic syndrome becomes fairly secure. An initially abnormal electroencephalogram followed by complete return to a normal pattern would have the same significance—that is, the multiple complaints would most probably have no organic basis by the time the electroencephalogram had returned to normal. In the majority of these patients the diagnosis of post-traumatic neurosis more accurately defines the situation many months or years after the original mild trauma. If psychotherapy is attempted a normal brain wave is also reassuring to the psychiatrist.

False-Negative Electroencephalography

In a small percentage of patients with various types of head trauma the pattern may be falsely negative. This error is usually corrected by the routine diagnostic measures that are ordinarily employed in the neurologic evaluation of patients with head trauma. These include x-ray films, spinal-fluid examination, arteriography, pneumoencephalography and, occasionally, burr-hole exploration.

False-Positive Electroencephalography

Approximately 15 percent of asymptomatic members of the general population have mild electroencephalographic abnormalities. If such persons suffer head injury, the pretraumatic brain-wave abnormality will be present after the injury, making evaluation more difficult. One can suspect the pretraumatic existence of brain-wave abnormality in patients who have an unchanging pattern of electroencephalographic abnormality after relatively mild head trauma. Among patients with epilepsy who coincidentally have head trauma the pre-existing paroxysmal type of electroencephalographic abnormality can usually be distinguished from the nonparoxysmal pattern found in most cases of head trauma.

Electroencephalogram in Postinfarction Brain Damage

Epilepsy may develop in a significant number of patients with lesions of the cerebral cortex as a result of cerebral hemorrhage, embolism or thrombosis. The mechanism is similar to that which causes post-traumatic epilepsy, such as a focal cortical scar surrounded by an epileptogenic focus. Serial electroencephalograms in these cases are useful because they alert the physician to the possible development of seizures within months to several years after the ictus. If the electroencephalogram is normal shortly after the cerebrovascular episode it is unlikely that post-infarction seizures will appear. On the other hand, a persistent, focal electroencephalographic abnormality with slow waves, sharp waves and spikes within weeks of the onset makes the development of postinfarction epilepsy highly likely. It is not unusual to treat such patients prophylactically with anti-convulsant medication in anticipation of the convulsive disorder.

Conclusions

The electroencephalogram is a useful and practical laboratory aid in the evaluation of patients with head trauma. The test is subject to vagaries of arti-

fact and problems of interpretation. It should be employed as part of a general neurologic evaluation by a properly trained physician. It is important that

the test be carried out under optimal conditions in accredited laboratories and that the interpretation of the tracing be made by suitably trained personnel.

PATHOLOGY OF RENAL ARTERY DISEASE

L. J. McCormack MD, H. P. Dustan MD, R. W. Gifford, Jr. MD, T. F. Meaney MD, B. H. Stewart MD, and W. S. Kiser MD, The Cleveland Clinic Foundation, Cleveland.*
Postgrad Med 40(3):348-354, September 1966.

The pathologic features of 97 diseased renal arteries are presented with emphasis on morphologic, biologic and prognostic differences. Atherosclerosis is the most common lesion; it primarily involves the renal arterial orifices of men. The fibrous stenosing lesions include intimal fibroplasia, medial fibroplasia with microaneurysms, subadventitial fibroplasia, and fibromuscular hyperplasia; each has a characteristic morphologic appearance.

There now is ample evidence to substantiate the occurrence of pathologic lesions in man responsible for the genesis of hypertension; the effect closely parallels that of Goldblatt and co-workers' experimental occlusions in animals. It is difficult to understand the spate of cases reported in recent years with so little prior evidence to indicate such a possibility. Historically, reports of only isolated cases, difficult to find, can be cited.

A great factor in the accumulation of the evidence has been the development of weaponry valuable in the detection of such lesions. Aortography, by any method, has proved invaluable to the physician hesitant to accept an initial diagnosis of "essential hypertension," especially in a young patient. Also of great aid have been the technics utilized to study differentially the functions of the kidneys either by assaying the various urinary constituents or through the employment of radioisotopes. Unanswered questions concern the normotensive patient with a lesion demonstrated by aortography performed for reasons other than renal disease and, less frequently, the patient with temporary great unilateral variations in renal function. Nevertheless the foundation of all these researches is the occurrence of an anatomic lesion of the main renal artery or its branches which in many circumstances is amenable to surgical correction with ensuing remission of the patient's hypertension.

Whereas atheroma is the most common overall cause of partial or complete blockade, to so designate all lesions of the renal artery deludes the clinician; many changes, especially in the young, apparently are not due to atheroma. Equally misleading is the general statement that all changes in these younger age groups are due to "fibromuscular hyperplasia." Some of us who originated the application of this term for renal artery disease reserved it, and still do reserve it, for a group of similar, highly specific morphologic entities and use other specific terms for the other general types of lesions.

The stenosing lesions of the renal artery can, for simplicity, be divided into two general groups: those associated with atherosclerosis and those associated mainly with deposition of collagen. The latter group can be further divided into four subgroups: (1) lesions that predominantly involve the intima, or *intimal fibroplasia*, (2) lesions that involve primarily the media, or *medial fibroplasia*; microaneurysms are so constant that we have extended the term to *medial fibroplasia with microaneurysms*, (3) lesions of the media marked by jumbling of fibrous tissue and collagen, or *fibromuscular hyperplasia*, and (4) disorders involving the area of the media immediately adjacent to and probably often including the *elastica externa*, or *subadventitial fibroplasia*. All these lesions are characteristic and recognizable as distinct entities morphologically and produce a differential angiographic pattern, provided a complication such as dissecting hematoma or thrombosis has not occurred.

Thrombosis can also occur as a primary, totally obstructing disorder of the renal artery and as such frequently has been initiated by trauma.

Pathologic Features of 97 Diseased Renal Arteries

During the last decade a total of 97 diseased renal arterial segments have been made available for

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study. This number does not represent all the patients who have undergone surgery, as it does not include patients treated by endarterectomy; we believe that atheroma was the most common occlusion in the latter group.

The renal arterial segments have been processed in the same fashion in the majority of these cases. After *in toto* fixation in modified Zenker's solution or formalin (4 percent), serial 3 mm. blocks were prepared by transverse section, with india ink marking of one side of the block to insure spacing of the histologic sections. A technic utilizing longitudinal opening of the vessels was employed initially, but was abandoned when it was found that certain pathologic changes were being missed. However, we have recently returned to longitudinal sectioning of selected arterial segments that show no evidence of thrombosis. This method allows one to see the length of the lesions and gives a clearer, three-dimensional picture of the changes present; such study is especially applicable to medial fibroplasia with microaneurysms.

In addition to the usual hematoxylin-eosin stains, sections were prepared for connective tissue study by the use of the Mallory-Heidenhain, Masson trichrome, Verhoeff-van Gieson, Gomori elastic, Mallory phosphotungstic acid-hematoxylin, toluidine blue, and Rinehart-Abul Haj stains. In selected cases frozen sections prepared from unprocessed blocks were stained by the Sudan IV method in order to study some of the lipids.

Atherosclerosis—An atheroma was usually found in men more than 30 years of age but also occurred in women. In a selected group, 12 of 30 patients had bilateral involvement. The lesion was usually found in the first 2 cm. of the main renal artery but occasionally was responsible for difficulty in a main branch supplying one pole. Pathologically the disorder assumed one of two forms. In a majority of the cases (approximately two-thirds), the lesion was an eccentric, predominantly fibrous plaque involving the vessel asymmetrically. However, sudanophilic material often in macrophages, could still be demonstrated in the fibrous tissue. In a minority of cases the vessel was extensively and circumferentially involved with narrowing of its lumen and destruction of the intima and usually much of the media by a replacement mass of acellular "porridge" that contained fat and calcium salts and was often marginated by histiocytes attempting to phagocytose the necrotic debris. Both these lesions could be complicated by superimposed thrombosis that completed occlusion

of the artery or by a dissecting hematoma that had its origin distal to the point of stenosis. Such a hematoma burrowed into the arterial wall and then extended for a short distance proximally and distally. The blood in this small sac could also clot and be the source of a thrombus. The dissecting hematomas by virtue of their location could also complete the occlusion of the artery by overriding the original stenotic area.

Intimal fibroplasia—This intriguing lesion occurred in 14 patients (nine males and five females) ranging in age from 18 months to 48 years. It appears to be a counterpart of a disorder that can involve any artery of the body. Occlusive disease of the type seen in renal arteries has been described in pulseless disease of upper and lower extremities and as being responsible for intestinal infarction, and may be seen in various arteries under diverse circumstances. The material within the renal artery seemed to be a circumferential accumulation of collagen containing variable numbers of fibroblasts and no demonstrable lipid. The collagen could, at times, be primitive, as demonstrated by its staining metachromatically with toluidine blue and positively with colloidal iron. Within this general group it appeared that the younger the patient the more likely it was for there to be disruption and reduplication of the elastica interna also, as though the lesion might be some type of congenital malformation. The artery distal to the lesion showed several destructive features. Dissecting hematomas could be found as well as fragmentation of the internal elastica with resulting thinning of the arterial wall. As a consequence either more stenosis or dilatation could be seen both in the morphologic specimens and on the comparative aortogram.

Medial fibroplasia with microaneurysms—This is the lesion that others persist in calling "fibromuscular hyperplasia." It is the one most easily recognized aortographically because of its resemblance to a string of beads. The lesion was present in 15 patients (12 women 30 to 59 years of age and three men 41 to 58 years of age). We believe that this lesion is predominantly one of the renal artery, although a rare similar lesion has been seen in other areas of the body. Grossly these arteries when opened longitudinally are most interesting and resemble either a congenital megacolon or a shed snakeskin because of the numerous small outpouchings on the intimal surface. Microscopically the lesion involved long areas of the renal artery and could extend into primary branches. The internal

elastic membrane was focally and variably thinned and lost. Both destruction and thickening of the media were encountered in a haphazard pattern, so that as one examined the section microscopically, the arterial wall appeared variably thickened and thinned. Within the thickened area much muscle was lost and replaced by collagen—hence the term “medial fibroplasia.” These thickened areas could also show some accumulations of collagen on the intimal surface, with further narrowing of the arterial lumen. In other areas thinning of the media occurred to the point of complete loss, and the microaneurysms could be seen as saccules limited by the external elastica and, for some reason unknown to us, resisting dissection. It must be strongly suspected that the presence of collagen firmly fusing the media to the external elastica and adventitia was the factor responsible for preservation of the integrity of the arterial wall. It is certainly most intriguing that these lesions do not dissect. Equally as remarkable is the fact that thrombosis is not a complication.

Fibromuscular hyperplasia—This lesion as we know it was the rarest type encountered, being present in only seven patients. Two small subgroups were recognized. In the first, consisting of three patients (one boy and two girls) 10 to 17 years of age, the renal arteries showed a concentric stenosing lesion thickening the wall of the renal artery, with a jumble of smooth muscle and fibrous tissue in variable quantity. At times the internal elastic membranes were lost. In the second subgroup, composed of four men 29 to 45 years of age, all the patients had rupture of the elastica interna distal to the fibromuscular thickening, with resulting development of an intramural hematoma. One must be most careful lest a patient who has intramural hematoma be assigned to this group without the certainty that fibromuscular hyperplasia is clearly present. There is tremendous reaction of the arterial wall to the dissecting blood, and as a consequence a large amount of new collagen is laid down around the margin of the hematoma. This reaction must not be called fibromuscular hyperplasia.

Subadventitial fibroplasia—We remind ourselves continually that this is a unique lesion occurring predominantly in young women. Our 31 patients included 26 females and five males whose ages ranged from 14 to 28 years. We believe that this most intriguing disturbance apparently involves only the renal artery. Pathologically it consists of a collar of dense collagen that envelops the renal artery for variable

lengths and variable thicknesses. The arteriogram may give the appearance of beading, but careful observation discloses that the caliber of the vessel is not distended by the “bead.” The collagen is deposited in the outer border of the media, usually replaces a considerable portion of the media, and may completely replace it in small areas. A few islands of smooth muscle occasionally are still seen trapped within the collagenous ring. Special stains disclosed that the lesion seemed to remain partially within the confines of the external elastic lamella. At times this layer was lost, but the adventitial connective tissue rings of elastic tissue could still be easily seen. Only one renal artery showed any additional complication, and this was in the form of thrombosis of the vessel.

We know of no reason why the lesion should involve predominantly the right side as it did in 16 of the patients; it involved the left side in seven and both sides in eight (usually being more severe on the right). One may well suspect that it represents some type of a flexing deformity related to a possible abnormal path of the right renal artery in some women.

Discussion

One may question this development of such a complex and diverse classification for pathologic lesions in such a restricted area of the body, especially since several of the subdivisions apparently are not applicable anywhere else. However, if one applies the criteria of a good classification, namely different causes, diverse biologic behavior, different structures, and variability of prognosis, one sees immediately that most of them are fulfilled, the major unresolved problem being cause. We do not know what caused any of the lesions, and speculation is fruitless. To ascribe an inflammatory cause to subadventitial fibroplasia, for example, in the absence of thrombosis would be foolish, as thrombosis is certainly a major element in all the other arteritides.

The biologic characteristics of the various groups are totally different. Extremes are represented by atherosclerosis and subadventitial fibroplasia. The former has been a disease affecting men, while the latter predominantly involves young women. Since atheroma formation can occur at any time, nothing can be determined about the patient by assessment of the intrarenal vascularity of either kidney. Arterial and arteriolar change may already be present before the development of a new atheroma that may compromise renal circulation to such an extent that

malignant hypertension occurs, a complication which may be entirely reversible surgically. In contrast, the lesions in young women protect the vascularity of the involved kidney so that no change can be detected. In hypertension of such duration, then, no secondary changes have time to occur in the uninvolved kidney. In the main the patients have not lived long enough for any other aging changes to develop in the vessels.

The morphologic changes have already been extensively alluded to and may be additionally extend-

ed so far as their radiographic appearance is concerned; in the pristine state without complications of either dissection or thrombosis, many of these lesions are highly characteristic.

As to prognosis, there is a difference among the groups also. In recent studies we have observed that patients with atheroma showed a less favorable response to surgery than did those young women who had subadventitial fibroplasia.

(The figures and references may be seen in the original article.)

CONSERVATIVE SURGERY FOR BLEEDING PEPTIC ULCER

R. K. Carruthers, MB, CH B; G. R. Giles,* MB, FRCS; C. G. Clark,* MD, CH M, FRCS, FRCS ED; J. C. Goligher,*CH M, FRCS, FRCS ED. Brit Med J 1(5532):80-82, January 14, 1967.*

Bleeding peptic ulcer accounts for 80 to 85 percent of hospital admissions for gastrointestinal haemorrhage (Tanner, 1954; Avery Jones, 1957; Aird, 1957). Improved supportive therapy and greater co-operation between physicians and surgeons have lowered the mortality in this condition. Mortality is influenced by the age of the patient, the severity of the bleeding, and the site of the ulcer. Patients over the age of 50 who continue to bleed may die unless treated surgically (Avery Jones, 1947). Chinn, Littell, Badger, and Beams (1956) found that patients under 50 had a mortality of 6 percent for duodenal ulcer compared with 22 percent for gastric ulcer, and in those over 50 the mortality was 14 percent and 48 percent respectively. On the other hand, Coghill and Willcox (1960) reported a mortality of 23 percent after emergency surgery for duodenal ulcer.

Partial gastrectomy has been the operation most frequently employed, and in selected cases the mortality has been as low as 5 percent (Ogilvie, Cardoe, and Bentley, 1952). Variations in the reported mortality can be accounted for by differences in the cases studied. The average mortality in patients with moderate to severe haemorrhage from all types of ulcer treated by partial gastrectomy is probably nearer 15 percent (Ward-McQuaid, Pease, Smith, and Twort, 1960). Smith and Farris (1958) suggested that this might be reduced by a more conservative operation in duodenal ulcer consisting in

direct suture of the bleeding vessel with vagotomy and a gastric drainage procedure. We have adopted this technique where circumstances seemed appropriate, and our experience of the surgical management of bleeding peptic ulcer is recorded.

Methods and Results

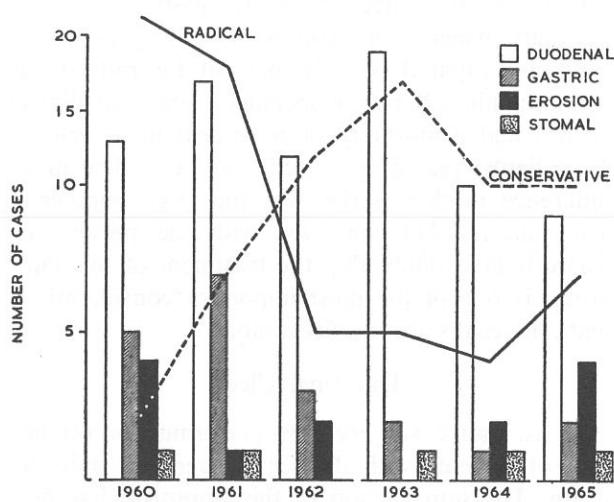
During 1960-5, 117 patients with haemorrhage from peptic ulcer were treated by emergency operation. They were referred from several physicians and the criteria for surgical referral varied widely. The majority of them, however, were operated on without delay, although during this period three others died after consultation but before surgery could be performed.

Five patients had haemorrhage from stomal ulceration—three after partial gastrectomy and two after gastroenterostomy; all were treated by vagotomy and gastric resection and there were no deaths. They have been excluded from further consideration. Of the remaining 112 patients 62 were treated in Aberdeen Royal Infirmary and 50 in the Professorial Surgical Unit in Leeds. There were 78 males and 34 females, whose ages ranged from 20 to 88 years. Haemorrhage resulted from acute erosions in 13 patients, from duodenal ulcer in 79, and from gastric ulcer in 20. In six of the latter there was an associated duodenal ulcer.

The choice of operation depends on the operative findings and the surgeon's experience. The more frequent use of the conservative operation during the period can be seen in the Chart and reflects the sur-

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geon's increasing familiarity with the circumstances in which it can be employed. Radical surgery was performed on 55 occasions, and consisted mainly of Polya gastrectomy, though Billroth I gastrectomy was more often employed for gastric ulcer. There were 57 conservative operations, usually vagotomy and pyloroplasty with suture of the bleeding vessel. On five occasions the appearance of the pyloroplasty after dealing with a duodenal ulcer was so unsatisfactory that a gastroenterostomy was added.



Number of patients with different types of bleeding peptic ulcer and the nature of the operations performed.

Table 1

CAUSE OF DEATH IN PATIENTS TREATED BY CONSERVATIVE AND RADICAL SURGERY FOR BLEEDING PEPTIC ULCER

Duodenal Ulcer		Gastric Ulcer		Erosions	
Radical (31)	Conservative (48)	Radical (20)	Radical (4)	Conservative (9)	
Burst abdomen	Coronary	Burst abdomen	Haemorrhage	Haemorrhage	
Burst abdomen	thrombosis	Peritonitis		Gas gangrene	
Burst abdomen		Coronary		Illeus	
Burst duodenal stump		thrombosis			
Burst duodenal stump		Respiratory			

Radical—10/55 (18%). Conservative—4/57 (7%).

The mortality from operations is shown in Table 1, and there is an apparent bias in favour of conservative surgery except in the treatment of erosions. One of the criticisms of conservative surgery has been a high incidence of postoperative bleeding. This is examined in Table II, which shows no significant difference between the overall frequency of this complication in the two types of operation. Nevertheless, a considerable difference is to be seen in the results for treatment of duodenal ulcer, where

five patients bled after conservative surgery compared with only one after radical surgery. Furthermore, three of these patients required a second operation because of continuing haemorrhage. Post-operative haemorrhage, however, contributed to the mortality only in the patients with erosions. Further surgery was performed for various reasons on 18 patients (Table III), one patient being operated on three times. These operations were performed more often after an initial radical operation, and there was a significant mortality associated with this, particularly in the duodenal ulcer group.

Table 2
PATIENTS WITH BLEEDING AFTER OPERATION. ITALICS INDICATE POSTOPERATIVE DEATH

	Duodenal Ulcer		Gastric Ulcer		Erosions	
	Radical (31)	Conservative (48)	Radical (20)	Radical (4)	Conservative (9)	
Transfused	Transfused	Transfused	Transfused Haemoperitoneum	Resect	Transfused	
	Polya	Polya		B.I-Polya		
		Polya				

Radical—6/55 (11%). Conservative—8/57 (14%).

* Patient had two resections.

TABLE 3
REASONS FOR FURTHER OPERATION AFTER DIFFERENT TYPES OF OPERATION. ITALICS INDICATE POSTOPERATIVE DEATH

Duodenal Ulcer		Gastric Ulcer		Erosions	
Radical (31)	Conservative (48)	Radical (20)	Radical (4)	Conservative (9)	
Burst abdomen	Re-bled	Burst duodenal stump	Re-bled	Re-bled	Re-bled
Burst abdomen	Re-bled	Haemoperitoneum	Re-bled	Re-bled	Fistula
Burst stump	Re-bled				
Burst duodenal stump	Subphrenic abscess				
Stomal obstruction					
Stomal obstruction					
Subphrenic					

Radical—12/55 (22%). Conservative—6/57 (10%).

TABLE 4
MORTALITY RELATED TO SEVERITY OF BLEEDING AND AGE OF PATIENT AT OPERATION

	Age				Severity	
	Under 50	50-59	60-80	Mild	Mod- erate	Severe
Radical	15	18(4)	22(6)	9	23(5)	23(5)
Conservative	29(2)	19(1)	9(1)	23	21(1)	13(3)
	44(2)	37(5)	31(7)	32	44(6)	36(8)

Numbers in parentheses indicate deaths.

The patients were grouped, according to the degree of haemorrhage, as severe, moderate, or mild. Severe and moderate haemorrhage conform to the criteria of Shepherd (1960). The mild classification includes patients with significant haemorrhage requiring transfusion but operated on early because they were known to have chronic duodenal ulcer. Others were operated on after several days because of continuing bleeding. The justification for this classification is that there was usually no great anxiety about the urgency of operation compared with the emergency posed by the remaining patients. Table IV shows that all the deaths occurred in the moderate and severe groups, with an incidence of 13 percent and 22 percent respectively. Despite the small numbers there is a clear advantage in conservative surgery for the treatment of those with moderate haemorrhage, but no real difference between the operations for severe haemorrhage. The mortality according to age is also shown in Table IV. The conservative operation has a much lower mortality in patients over the age of 50, but the Table also shows a tendency for conservative surgery to be performed more often in younger patients, particularly those whose haemorrhage was classified as mild. This may represent an unconscious bias of the surgeon in favour of trying out a new approach in the younger and fitter patient.

Discussion

The problem of bleeding peptic ulcer has recently been reviewed (*Brit Med J*, 1965) and the operative management discussed. Mailer, Goldberg, Harden, Grey-Thomas, and Burnett (1965) have demonstrated that accurate diagnosis within 24 hours of admission is feasible, but there is no unanimity of opinion about the correct surgical approach. Encouragement to employ conservative procedures is based mainly on the reports of Farris and Smith (1960), Dorton (1961), and Foster, Hunt, and Dunphy (1964). The present study attempts to examine the merits of conservative surgery and is based on six years' experience. When operative treatment is the subject of critical analysis random allocation to treatment groups is ideal, but when established operative techniques have proved valuable the exploration of a new procedure is performed more cautiously. The approach in the present series is similar to that adopted by Foster *et al.* (1964), and our conclusions are in general agreement. Conservative surgery in bleeding peptic ulcer carries half the mortality of partial gastrectomy. There is an un-

doubted bias in this study to use conservative surgery in more favourable circumstances. Nevertheless, experience allows an appraisal of the circumstances when conservative surgery can be employed.

Comparison of mortality rates in different series is difficult because of the non-homogeneous nature of the groups. The overall mortality in the present series is 12 percent, which compares with 14.3 percent reported by Ward-McQuaid *et al.* (1960) in a similar group treated by partial gastrectomy. Our mortality when using conservative surgery was 7 percent compared with 18 percent for radical surgery. Banning, Baron, Kopelman, Lam, and Warren (1965) had a mortality of 6 percent in a series of 49 patients treated by selective surgery. The major difference in their series was the large number of acute ulcers (21) compared with the present 13. There is little doubt that the treatment of this latter group is one of the most important considerations, and our results are less favourable.

Duodenal Ulcer

Conservative surgery was performed in 60 percent of patients with duodenal ulcer and only one death. The introduction of this approach has been followed by a high incidence of postoperative bleeding, necessitating reoperation in three patients. This unfavourable sequel was due to inadequate control of haemorrhage from the ulcer, a feature that may be overcome with experience, though it represents one of the major technical difficulties of the conservative operation. Foster, Hickok, and Dunphy (1965) thought that postoperative haemorrhage was as common after partial gastrectomy as after conservative surgery. Gardner and Baronofsky (1959) reported an incidence of 8 percent postoperative haemorrhage after Billroth II gastrectomy, and the incidence in the present series is 11 percent. To some extent the risk of further bleeding after conservative surgery is balanced by the likelihood of a second operation after radical surgery for other reasons. Burst abdomen, ruptured duodenal stump, and stomal obstruction complicated partial gastrectomy for duodenal ulcer and contributed to the mortality in four of the five patients.

There were no deaths in the 32 duodenal ulcer patients under 50 years of age. In those aged 50 and over there were five deaths in 22 patients (22.7 percent) treated by radical surgery, compared with one death in 25 patients (4 percent) treated by conservative surgery. In 25 patients with severe or mod-

erate haemorrhage there were five deaths after gastrectomy (20 percent) compared with one in 24 patients (4 percent) with conservative operation. There is every indication, therefore, that this operation is the procedure of choice in the bleeding duodenal ulcer.

Smith and Farris (1958) originally introduced the conservative approach for bleeding duodenal ulcer and had no death in 21 cases. Westland, Moivius, and Weinberg (1958) reported similar findings with 24 patients, but later Weinberg (1963) recorded a mortality of 5.6 percent in 71 patients with massive haemorrhage from duodenal ulcer. Dorton (1963) reported 100 consecutive cases with varying degrees of haemorrhage from duodenal ulcer. There were no deaths and no episodes of postoperative haemorrhage. About half the patients had major haemorrhage, and this result argues strongly in favour of the adoption of conservative surgery for duodenal ulcer.

The value of the conservative approach in all forms of bleeding peptic ulcer is less assured. Foster *et al.* (1964) found the mortality in massive haemorrhage reduced from 36 to 19 percent after adopting the conservative approach. However, Kelle, Grant, and Elliot (1963) in a comparative study of partial gastrectomy, vagotomy and antrectomy, and vagotomy, pyloroplasty, and suture found an overall mortality of 19 percent and no difference in the mortality between the three procedures. Similarly, Akin and Sullivan (1963) reported unfavourably on the use of vagotomy and pyloroplasty, 20 patients being treated, with three deaths and three episodes of postoperative haemorrhage. In the present series the comparative mortality in two three-year periods, 1960-2 and 1963-5, shows little difference, 13.5 percent against 11.3 percent. These results, however, conceal the improvement that has obtained in the treatment of duodenal ulcer with the conservative approach.

Gastric Ulcer

We have no experience of the conservative approach to bleeding gastric ulcer. All patients were treated by resection, with a mortality of 20 percent. There seems no reason why the smaller gastric ulcer should not be dealt with by underrunning sutures, vagotomy, and pyloroplasty. There appears to be little doubt from the reports of Farris and Smith (1963), Burge (1964), and Hendry and Bahrani (1965) that vagotomy and pyloroplasty is often successful in the definitive treatment of gastric ulcer. In

view of the high mortality of partial gastrectomy in bleeding gastric ulcer, a trial of vagotomy, pyloroplasty, and suture might be made in emergency circumstances, though we have reservations about the possibility of satisfactory control of haemorrhage from a large posterior-wall ulcer.

Erosions

The conservative approach appears most attractive in the treatment of acute erosions, yet our experience is not entirely satisfactory. Gray, Walters, Priestley, and Waugh (1953) reported on two groups of patients treated in the Mayo clinic, one by "blind" gastrectomy and the other by laparotomy alone. Recurrent bleeding was found in 11 percent of the former and 63 percent of the latter. This argues in favour of the operative management in some of these cases. Some of the difficulties encountered in dealing with this group of patients arose from failure to make a diagnosis, with delay in treatment. Diagnosis may be made by gastroscopy (Burnett, 1962), and a nonoperative approach has been recommended for acute ulceration. Many surgeons, however, believe this to be dangerous, particularly in the older age groups, and, hitherto, blind gastrectomy has often been used for the treatment of this condition. Bruce and Dudley (1959) had three deaths in a group of 31 patients treated in this way, and thought that gastrectomy would remove the lesion in 75 percent of the patients and arrest the bleeding in most of the remainder. Gastrotomy with identification of the bleeding-point is more attractive, and Markby (1965) emphasized that erosions were constantly high on the lesser curve but were often overlooked.

There are some difficulties, however, about this apparently simple procedure. Bleeding-points are often multiple, and inspection of the whole mucosa demands a wide gastrotomy of at least 5 in. (12.5 cm.). We have no experience of the procedure of using the sigmoidoscope to inspect the interior of the stomach (Burge, 1961) and prefer, like Tibbs (1960), to empty the stomach of clot and make a careful search for bleeding. In the region of the fundus this is considerably aided by a deep retractor such as that used for pelvic operations. The acknowledged risk of blind gastrectomy is bleeding from an ulcer above the line of resection. Three of our four patients with erosions dealt with by gastrectomy re-bled; two of these required further operation, from which one died. Our experience of conservative surgery in this group is equally

disappointing. Three of the nine patients had further bleeding, and two of these died. A third death in this group resulted within 48 hours of operation from a clinical picture resembling gas gangrene, though this was not proved. This patient had a hiatus hernia, and in the conservative approach to massive haemorrhage it might be advisable to leave the hernia to a later date and deal specifically with the bleeding.

The use of vagotomy in subjects with acute erosions is debatable, but in view of the frequency of multiple small lesions we believe it has merit. This might have prevented further haemorrhage in the patient operated on three times and who subsequently died after total gastrectomy. That such a technique does not inevitably cure the ulceration, however, is illustrated by the case of a patient who died with a persistent and even larger acute ulcer at the site of an erosion originally sutured at the first operation. Though our experience of the conservative approach to acute erosions has not been as favourable as that of Foster *et al.* (1964) or Banning *et al.* (1965) we continue to use it.

Conclusion

The present study suggests that vagotomy, pyloroplasty, and direct suture of the ulcer is indicated in the treatment of bleeding duodenal ulcer. Further bleeding results from poor technique. The possibility of a similar approach to bleeding gastric ulcer

should be considered, especially in the smaller ulcers situated on the lesser curvature, where it should be technically easy to control bleeding. In dealing with acute erosions consideration should be given to the adoption of vagotomy and pyloroplasty in addition to direct suture. It may be that this affords the patient immediate protection from further erosive gastritis and possibly prevents a repetition of the event in the future.

Summary

The surgical treatment of bleeding peptic ulcer over a period of six years is reviewed. Vagotomy, pyloroplasty, and direct suture of the bleeding vessel was performed in 57 out of 112 patients; and the mortality of this operation in patients with duodenal ulcer was lower than with emergency partial gastrectomy.

Recurrent bleeding was observed in eight patients after conservative surgery, four requiring a second operation. A further operation was necessary in 11 patients treated by gastric resection. Conservative surgery seems to be satisfactory in the treatment of bleeding duodenal ulcer, and warrants consideration in the treatment of gastric ulcer. The place of conservative surgery in the treatment of erosions remains uncertain.

(The references may be seen in the original article.)

MEDICAL ABSTRACTS

SPONTANEOUS PNEUMOTHORAX: TREATMENT AND MORTALITY

W. Y. Inouye MD, R. B. Berggren MD, and J. Johnson MD, (From the Harrison Department of Surgical Research, School of Medicine, University of Pennsylvania and Philadelphia General Hospital.)

Dis Chest 51: 67-73, January 1967.

The records of 76 patients from the Hospital of the University of Pennsylvania and 77 patients from the Philadelphia General Hospital with spontaneous pneumothorax have been analyzed for etiology, recurrence, mortality and method of treatment. There was a total of 176 episodes.

One-hundred and eighteen patients (72.3 percent of the total group) had no demonstrable pulmonary disease or blebs, usually found at the apex of the lung. This group was the youngest (average age 35 years), predominantly men (92 percent) and the mortality rate was 2.5 percent.

Twenty-three patients (14.1 percent) had pulmonary tuberculosis: their average age was 51 years; 91 percent were men and the mortality rate was 17 percent.

Twelve patients (7.4 percent) had underlying pneumonia. One-half of the group averaged 11 months in age, and the remainder of the group averaged 61 years. Two-thirds of the group were men and the mortality rate was 50 percent.

The miscellaneous group was comprised of ten patients (6.2 percent). The average age was 69 years, six were men and there were two deaths.

The largest group of the patients was treated by closed tube thoracotomy (46 percent of the episodes); 28.4 percent of the pneumothoraces were treated by the expectant method; 13.1 percent by either pleurectomy or wedge resection and 12.5 percent by thoracentesis. Patients with recurrent episodes of pneumothorax, bilateral pneumothorax, massive hemopneumothorax, persistent air leak, or failure of lung to expand promptly with lesser procedures should be treated by open thoracotomy and pleurectomy.—Authors' summary.

THE POSSIBLE ROLE OF HEMOCONCENTRATION IN THE ETIOLOGY OF MYOCARDIAL INFARCTION

D. P. Stables MB FCP (SA), A. H. Rubenstein MB MRCP FCP (SA), J. Metz MD MC Path, N. W. Levin MB FCP (SA), Johannesburg, South Africa.

Amer Heart J 73: 155-159, February 1967.

Venous hematocrit was measured in 35 patients with acute myocardial infarction and in 40 control subjects under strictly defined conditions (venous blood was obtained between two and three p.m. on one of the first three hospital days with subjects in recumbent position for at least one hour beforehand and the arm used for sampling kept at right atrial level; compression of the vein was maintained for the briefest period compatible with successful venipuncture; and withdrawal of the sample was delayed for 30 seconds after release of compression). A significantly greater proportion of the coronary group had high hematocrit values. Studies of blood volume showed that a reduction in plasma volume was more frequently responsible than an increase in red cell mass. The investigators believe that their results support the belief that elevation of the hematocrit may be a factor in the development of myocardial infarction.

INTELLECTUAL AND PERSONALITY CHANGES FOLLOWING OPEN-HEART SURGERY

Harold Gilberstadt PhD and Yoshio Sako MD PhD, (From the Veterans Administration Hospital, Minneapolis, and the University of Minnesota Medical School.) Arch Gen Psychiat 16: 210-214, February 1967.

The authors discuss the reputedly high incidence of delirium or psychosis characterized by perceptual distortion, hallucinations and paranoid ideation occurring two to five days following open-heart surgery in introducing their article. Predisposing factors which statistically are more frequent in patients developing delirium are listed as seriousness of illness

preoperatively, degree of physical stress during surgery, and environmental circumstances such as marital instability, overwhelming personal problems, and a lack of positive interpersonal support during hospitalization. To these, they add recovery room experiences as necessary if not causal factors. The study was undertaken to evaluate intellectual and personality changes following open-heart surgery using objective psychological testing.

A group of 53 patients was studied. Evidence of slightly lowered intellectual efficiency was found supporting the reports that at least in some instances, brain damage does occur during surgery, but perhaps not to a degree which in itself would significantly impair adjustment in the great majority of survivors. A comparatively low incidence of delirium (13 percent), the authors think, was probably due mainly to comparatively short bypass time which resulted in lessened surgical stress; but they interpreted the finding that patients developing delirium were more intelligent and alert than those not developing delirium as indirect evidence in support of the hypothesized importance of abnormal sensory input in the recovery room as a precipitant of delirium. The patients with the least reserve due to old age, poor intellectual capacity, and presurgery neurological complaints were the poorest surgical risks, but many such patients survived and were given a new lease on life.

FATE OF PATIENTS WITH RECURRENT CARCINOMA OF THE BREAST— RECURRENCE FIVE OR MORE YEARS AFTER INITIAL TREATMENT

A. N. Papaioannou MD, F. J. Tanz MD, and H. Volk MD, (From the Department of Surgery, Albert Einstein College of Medicine of Yeshiva University, New York, New York.) Cancer 20: 371-376, March 1967.

This study was undertaken to examine the behavior of mammary cancer in patients who enjoyed a long "free of disease" interval and in whom eventually recrudescent disease developed five years or more after the original treatment. Two hundred and

thirty-nine records from the Bronx Municipal Hospital Center Tumor Registry of patients with recurrent disease were reviewed; 57 with late recurrences—after five or more years—were studied. These were compared with a group of 66 patients who developed recurrences in one to two years after original treatment. The mean survival time in the group with late recurrence was 1.9 years; in the group with early recurrence, two years (statistically insignificant). In the majority of patients with late recurrence, the disease, when it did recur, tended to pursue a comparatively rapid course; this was only slightly different from those in whom there was early recurrence. However, a small percentage of patients in both groups survived for long periods after metastases occurred. The authors state that the factors which determine prolonged latent periods between definitive treatment and recurrence are unknown.

TATTOOED SAILORS: SOME SOCIO- PSYCHOLOGICAL CORRELATES

LT J. H. Earls MC USN and R. Hester PhD, Milit Med 132: 48-53, January 1967.

Reports in the medical and psychological literature suggest that tattooing is indicative of a maladjusted personality. The present study was to determine whether the presence of tattoos is predictive of a poor adjustment to the United States Submarine Service. All tattooed men coming to the United States Navy Submarine School during a five month period, and a matched group of control subjects, were studied. There were 715 candidates reporting for training in the study period; 73 subjects (10.2 percent) were tattooed. It was shown that the tattooed man was more likely to have come from a problem laden, lower socio-economic class family, to have been a high school drop-out, and to have spent time in jail. However, there was found to be no significant difference in the current personality adjustment or the performance of the subjects in Submarine School. Thus the presence of tattoos cannot presently be considered a significant indicator of success or failure in Submarine School.—Authors' summary.

is a study of the behavior of mammary cancer in patients who enjoyed a long "free of disease" interval and in whom eventually recrudescent disease developed five years or more after the original treatment. Two hundred and

thirty-nine records from the Bronx Municipal Hospital Center Tumor Registry of patients with recurrent disease were reviewed; 57 with late recurrences—after five or more years—were studied. These were compared with a group of 66 patients who developed recurrences in one to two years after original treatment. The mean survival time in the group with late recurrence was 1.9 years; in the group with early recurrence, two years (statistically insignificant). In the majority of patients with late recurrence, the disease, when it did recur, tended to pursue a comparatively rapid course; this was only slightly different from those in whom there was early recurrence. However, a small percentage of patients in both groups survived for long periods after metastases occurred. The authors state that the factors which determine prolonged latent periods between definitive treatment and recurrence are unknown.

AWARDS AND HONORS SECTION

SILVER STAR

Johnson, Charles E., HM3 USN
Smith, Robert L., HM3 USN

BRONZE STAR

Hewitt, Larry E., HM3 USN
Kaltman, N. A., HN
Leathers, R. D., HM3
Manning, Everett W., HM3 USN
Martin, E. H., HN
Strickland, Terry L., HM3 USN
Taber, James K., HM1 USN

LEGION OF MERIT

Millar, Jack W., CAPT MC USN
Welham, Walter, RADM MC USN
Workman, R. D., CAPT MC USN

NAVY COMMENDATION MEDAL

Bell, Winston T., HM3 USN
Kinney, Charles E., HM2 USN
McKay, Bernadette A., LCDR MC USN
Moss, Gerald S., LCDR MC USN
Norris, Michael J., HM2 USN

NAVY COMMENDATION FOR ACHIEVEMENT

Butler, Robert C., LT MSC USN
Foster, Oscar P., Senior, HMC USN

CERTIFICATE OF COMMENDATION FROM THE U.S. MARINE CORPS

Bunch, Thomas W., LT MC USNR

RVN MEDAL OF HONOR Second Class

Brown, Thomas L., DT3 USN

NAVY UNIT COMMENDATION AWARDS

Dates of Action

CONSTELLATION (CVA-64) and Attack Carrier Air Wing FIFTEEN (CVW-15)	29 May-24 Nov 1966
COONTZ (DLG-9)	14 Feb-25 Jul 1966
HANCOCK (CVA-19) and Attack Carrier Air Wing TWENTY-ONE (CVW-21)	6 Dec 1965-25 Jul 1966
ORISKANY (CVA-34) and Attack Carrier Air Wing SIXTEEN (CVW-16)	12 Jun-1 Nov 1966
SHARK (SSN-591)	A period in 1966
Naval Support Activity, Danang	15 Oct 1965-15 Aug 1966
Naval Communication Station, Philippines, Detachment "A"	17 Aug 1964-1 Aug 1965
Helicopter Combat Support Squadron ONE (HC-1), Detachment FIVE	23 Feb-5 June 1966
3rd Medical Battalion, 3rd Marine Division (composed of Navy Medical Personnel)	7 Jul 1965-20 Feb 1966

DENTAL SECTION

POLICY ON STERILIZATION

An article similar to the following appeared in the U.S. Navy Medical News Letter several years ago. Because of the vital significance of the subject, all dental officers are urged to insure that the performance of all concerned conforms to standards as set forth in the article.

In the recent past, a tri-service study agreed that sterilization by boiling had been proven inadequate in destroying certain organisms and therefore was not professionally acceptable to the military medical services. Thus, surgical instrument sterilizers of the boiling water type, with the exception of a few for special application, have been deleted from the Federal Supply Catalog. This action is consonant with the information contained in Accepted Dental Remedies, 1964, which all dental officers are advised to consult for details. For the purpose of U.S. Naval Dental Corps policy then, sterilization is defined as the destruction of all microbial forms. This may be accomplished by steam under pressure (autoclave) or prolonged dry heat (oven). Disinfection is defined as destruction of infectious microorganisms in the vegetative state. Spores and certain resistant vegetative microbial forms are not destroyed. This may be accomplished by chemical agents (ethyl alcohol, quaternary ammonium compounds).

The Autoclave. The most reliable sterilizing agent is superheated steam under pressure. No living thing can survive ten minutes direct exposure to saturated steam at 121°C (249.8°F), which is attained under ideal conditions at sea level with 15 pounds pressure in the autoclave. However, additional time must be allowed for the items being sterilized to reach this temperature. Since it is the direct exposure to live steam (and not the pressure) which sterilizes, it is imperative that proper procedures be followed, e.g., elimination of air pockets through proper pack preparation and loading, and elimination of air from the autoclave chamber. The latter is a frequently neglected step; it may be accomplished by flushing the autoclave with steam until the thermometer in the discharge line shows that the escaping vapor is at 100°C or higher, following which the sterilizing cycle is started. With a jacketed autoclave, sterilized material can be vacuum dried in a short time.

The Oven. Recently made available in the Federal Supply Catalog under stock number 6530-962-9965, (Sterilizer, Surgical Instrument, Dry Heat Type, Electrically Heated, CRM, 11½ x 6½ x 5 inches, 110 volt, 60 cycle, AC, Unit: each. FSC price \$68.00) is an excellent sterilizing oven which is especially appropriate for dental use. In the Defense Medical Materiel Board user test, the only disadvantage noted was the longer sterilizing time required, while this oven's greatest advantage was its ability to sterilize metal instruments on which it is essential to preserve cutting edges and where rust or tarnish is a factor. Its other reported advantages were no water level to maintain, thermostat adjustment easily made without opening the chamber, no pressure involved, very little heat dissipated from the sterilizer to the operating room, instruments and packs ready for immediate use after the sterilizing cycle, and no dulling or temper change of cutting instruments and blades. As with the autoclave, the operator must allow time for the instruments to reach sterilizing temperature (160-180°C, 320-355°F) before timing the sterilizing cycle. Again, care should be given to proper loading of the chamber to permit adequate hot air circulation.

Sanitization. All methods of sterilization and disinfection are impeded by the presence of debris. Numerous reports in scientific literature illustrate the protective effect of organic debris against sterilization. Instruments must be scrubbed with brush, detergent and water, and subsequently, rinsed before sterilizing. Syringe needles present a particular hazard in the difficulty of removing congealed blood from the lumen. Pre-sterilized disposable single-use needles are recommended. When it is necessary to reuse needles, they should be cleansed by passing a wire stylet through the lumen and rinsing. Considering the poor convection of autoclave steam through the narrow lumen, the dry-heat oven is the method of choice for sterilizing needles for reuse.

Handpiece Sterilization. Conventional belt-driven handpieces may be sterilized either in the autoclave or the dry-heat oven. At the present time, there is

no uniform method for sterilizing air-turbine handpieces.

Charbeneau, G. T. & Berry, G. C., JADA 59: 732-737, 1959, described a simple and effective autoclave method for all metal dental instruments including the conventional handpiece. To prevent rusting, the instruments are coated before each autoclaving with a protective oil-water emulsion. Injection syringes and needles should not be coated with emulsion because of danger of oil emboli when used for injection.

Modern silicone lubricants make oven sterilization of conventional handpieces appear feasible. The few literature reports on this subject are inconclusive. Further research and testing will be required before a firm policy can be established. A recommended silicone lubricant is FSN 9150-664-0047, 50 Centistoke "Damping Fluid," 1 lb. can, available from DGSC Richmond, Va., at \$1.80 per can. This "damping fluid" is of the Dow Corning 200 series, whose freedom from topical toxicity has been well established. (Crowe, F. W., JAMA 149: 1464, 1952) (Barondes, R. et al, 5 Mil Surg 106: 378, 1950.)

When oven sterilization is adopted as standard procedure, the handpiece is sterilized after each patient. The following cleansing routine is recommended. Each time water has entered the handpiece, or in any case, after it has been used six times, the handpiece is completely dismantled, thoroughly cleansed with a solvent, dried, relubricated with silicones, wiped with a clean cloth to remove excess lubricant, reassembled and oven sterilized for 1½ hours at 175°C. This prolonged heating period is dictated by the metal mass of handpieces. After cooling, it is ready for use. Acceptable solvents for the two silicones described above are: amyl acetate, benzene, ethyl ether, gasoline, kerosene, methylene chloride, naphtha or toluene.

Concerning air-turbine handpieces, there is no single sterilizing or germicidal method applicable to all models. Therefore, the dental officer should adopt the most effective procedure within the manufacturer's directions. For those air-turbine handpieces which will tolerate it, the autoclave or oven should be used. For others, it will be necessary to use the germicidal oils, etc., recommended by the manufacturer, and to wipe the external surfaces with ethyl alcohol soaked sponges—after each use and again before use on a new patient.

The use to which a handpiece is to be put should be considered in relation to sterilization require-

ments. Oral Surgery requires a sterile handpiece. The needs of clinical operative dentistry often dictate use of disinfection procedures. The Naval Dental School's Oral Surgery Department has successfully used autoclaved Densco air-turbine handpieces for over a year with no evident damage to the instrument. After each use, the handpiece is completely disassembled, cleansed, lubricated with petroleum lubricants, aluminum foil wrapped (loosely to permit steam circulation), autoclaved and vacuum dried. Obviously this procedure is justified in cases where tissue may be deeply invaded. Alternatively, in clinical operative and prosthetic procedures wherein the handpiece is used almost constantly, some air-turbine models would be likely to break down as a result of frequent autoclave sterilization; and since tissues are not deeply invaded, chemical disinfection should suffice.

Ethylene oxide sterilization offers much promise toward handpiece sterilization (Wachtel, L. W. & Armstrong, L. M. USN Med News Letter 43(4): 22, Feb. 21, 1964). Unfortunately, this system will require more research, development, test and evaluation before an ethylene oxide sterilizer can be standardized for fleet and field use.

Disinfection. Chemical disinfectants have a distinct place in dental practice. As a whole, they are incapable of killing spore formers and the more resistant vegetative pathogens such as the tubercle bacillus and the hepatitis viruses. The Council on Dental Therapeutics of the American Dental Association recognized these and other limitations. It stipulates that chemical disinfectants must be effective in killing vegetative pathogens with the possible exception of *M. tuberculosis* within five minutes to be acceptable for dental practice. However, the Council recommends a minimum exposure of 15 to 30 minutes to provide a margin of safety. Chemical disinfectants have poor penetration of organic materials; they are not acceptable for penetration of hinged or deeply grooved instruments; they are not acceptable for use on instruments which are to enter tissue or contact the patient's bloodstream.

Although a variety of chemical disinfectants are available, other than the special disinfectant oils for high speed handpieces, only two are recommended for Dental Corps use: 70 percent ethyl alcohol and quaternary ammonium compounds. In common practice, chemical germicides are used as holding solutions for sterilized articles. Such holding solutions may readily be contaminated with pathogens through careless handling; if this is to be used, the

container should be covered, and special sterile tongs should be provided. Far more preferably, sterilized articles should be stored dry in the container in which they were sterilized.

It is well established that the effectiveness of chemical disinfectants is reduced by organic contamination and dilution. Quaternary ammonium compounds degrade with age. A fresh supply should be provided at least once a day; none should be held overnight.

Anesthetic carpules require special consideration. They may be autoclaved and stored in sterile containers prior to use. If this procedure is followed no additional treatment is required. If there is any question about contamination of the cap, the carpule should be immersed for 15 - 30 minutes in 70 percent ethyl alcohol. Because of the possibility of infusion by chemical disinfectants, gaseous materials and prolonged submergence, these agents should be avoided.—Dental Div, BuMed.

NURSE CORPS SECTION

COURSE IN WARD MANAGEMENT FOR NURSE CORPS OFFICERS

A two week course for Navy Nurse Corps officers was conducted at the Naval Medical School, NNMC, Bethesda, Maryland under the direction of CAPT John Stover Jr. MC USN from 27 February 1967 to 10 March 1967. The program was planned to assist Navy Nurse Corps officers in developing their ward management skills and was attended by 18 Nurse Corps officers from 11 Naval Hospitals in the United States. Selected comments from some of the sessions are presented here for the reader.

The Nursing Care Plan was identified as a tool to assist the nurse in providing patient care by identifying the individual patient needs and prescribing nursing measures to meet these. These plans should be based on scientific principles of nursing, and if so, will not only carry out desirable nursing care, but will provide valuable on the job nursing inservice education for all personnel.

Some samples of some nursing measures that could be written on the nursing care plan are:

Lights at night for the elderly disoriented patients.
Clocks for disoriented patients.

Positioning of blind patients' units in the same manner.

Orientation needs of the newly admitted patient.

Low beds and side rails for elderly and disoriented patients.

During a discussion on the value of communications three approaches to a patient who is to ambulate were discussed:

Are you going to ambulate?
You will ambulate!
What time would you like to get up today?

The group was asked to try to see the hospital through the eyes of the patient, as it is considered that the greatest need the patient has is for security. Some methods which assist in providing this for patients were discussed, as:

Informing patients about tests.
Preparing patients for changes in therapy.

The manner in which a patient is initially received on the ward, as this deeply affects his perception of the hospital.

Permitting patients to help each other and encouraging them to do so. It was noted that this gives the feeling of being needed and valuable.

There was considerable discussion concerning the delegation of patient care during the course. Some of the tools that assist the nurse in the assignment of patient care were discussed:

Assignment sheets for ward staff personnel. The need for properly identifying the patients' needs and priorities of these needs on assignment sheets was discussed, as well as the need to distribute work equitably and according to the individual's previous experience.

Job descriptions.
Ward conferences.
Nursing Care plans.
Oral reports.

Also included in the many sessions were lectures and discussions on interpersonal relations, ward activities, staff attitudes, and values in nursing.

PARTICIPANTS, WARD MANAGEMENT COURSE, NNMC, BETHESDA, MD.



Left to Right (First Step): LT Sondra K. Handlin, LTJG Leanna J. Crosby, LT Phillis J. Fleury, LT Frances P. Chibas (Second Step): LT Dolores E. Cannoles, LT Rosemary B. Geraghty, LT Cynthia A. Schultz (Third Step): LCDR Angeline G. Liakos, LT Helen M. Koester, CDR Mary F. Cannon, CAPT John H. Stover, Jr., LCDR Katherine Wilson, LT Margaret I. McLaughlin, LCDR Alicia M. Foley, LCDR Dorothy C. Zanelli, LT Janice B. Rudnicki, (Fourth Step): LT Barbara J. Bevan, LT Nancy A. Harris, LT Kathleen R. Dopke, LT Joyce A. Deneault, LT Mary L. Antonini (Fifth Step): LT Karen A. Folsom, LCDR Bernadine L. Ayling (Sixth Step): LT Monica B. Durupt

PREVENTIVE MEDICINE SECTION

A NOTE ON THE THERAPY OF FALCIPARUM MALARIA IN SOUTHEAST ASIA

The following comments were provided by LT William H. Adams MC USN. Dr. Adams spent approximately 20 months in Vietnam, at the Station Hospital, Saigon; then extended for assignment to the Preventive Medicine Unit (G-18) component, Naval Support Activity, Da Nang. Dr. Adams is now on a research fellowship with the California State Health Department.

Drug refractoriness of some Southeast Asian

strains of *P. falciparum* malaria, despite almost two years of wide experience with various therapeutic regimens, continues to be a major medical problem among U.S. Forces. Drug relapses and difficult or prolonged treatment schedules make most present regimens far from ideal. This is a preliminary report on a regimen devised in July, 1965, at the Navy Station Hospital, Saigon, which utilized the following drugs:

1. Chloroquine phosphate, 400 mg. base IM on admission
2. Chloroquine phosphate, 300 mg. base p.o. BID for six days*

3. Pyrimethamine, 25 mg. base p.o. BID for six days*

4. Sulfa drugs (Gantrisin and sulfadiazine have been used), 1.0 gm. p.o. QID for six days*

* All three drugs given concurrently.

To date well over 150 patients have received the above therapy, and although follow-up data is not yet complete, no relapses are known. It is requested that any experience with either success or failure of this regimen be reported to BUMED, Code 72.

Some of the favorable aspects to this treatment include the fact that it utilizes drugs already in existence and with which there has been long experience; the duration of therapy is only six days, as opposed to the two weeks frequently required when quinine is given; the side effects of the latter drug, including the possible precipitation of Blackwater Fever, are circumvented; and the drugs are extremely well tolerated. The chloroquine acts early to control parasitemia in those cases which are to various degrees sensitive to the drug, and impressions gained at the Navy Station Hospital, Da Nang, suggest that there is less anemia when chloroquine is used concomitantly with slow acting drugs such as pyrimethamine.

It is suggested that a course of primaquine, 26.5 mg. salt daily for 14 days, be given to all cases of malaria, even if *P. vivax* is not noted on smear. A significant number of *vivax* cases have developed after discharge and return to CONUS. These would be obviated with this simple therapeutic addition. In pernicious forms of malaria, in those cases which are very toxic, and perhaps in those with parasitemias of over 50,000/mm³ (approximately 1% of cells parasitized), quinine, either 600 mg. IV or 1.0 gm. p.o. for one or two doses, may produce a more rapid response when added to the suggested regimen.

The relatively low mortality rate from falciparum malaria noted thus far is partly due to early suspicion of the diagnosis. In endemic malarious areas any febrile illness with a temperature over 103° is a prime suspect as malaria, either alone or in combination with another illness (e.g. scrub typhus). Early laboratory evaluation is essential. The rapid response of the malarial fever to aspirin is very misleading, and may lead one to hold a patient longer than is necessary. A rapid fall from high to normal or subnormal temperatures following aspirin should, if anything, lead one more strongly to suspect malaria.—PrevMed Div, BuMed.

MALARIA ERADICATION IN 1965

Trop Dis Bull 63(12): 1305-1306, Dec 1966.

In 1965, the number of people living in areas where the transmission of malaria has been stopped or eradication has been achieved, increased by over 105 million.

Of an estimated population of 1,576 million living in the originally malarious areas of the world, 77% occupy areas where the disease has been eradicated or eradication programs are in progress. More than 900 million persons (57%) live in areas where routine house spraying has been discontinued as being no longer necessary.

Of the population not covered by malaria eradication programs, 184 million occupy areas where pre-eradication programs are already in progress. There remain a number of countries with a total population of 86 millions, mainly in Africa, who have not yet indicated their intention of adopting a policy of total eradication.

Setbacks have occurred in certain programs, e.g., in Ceylon, Jordan, Iraq and Syria, where it was found necessary to revert to measures of attack in some areas. Similar foci have come to light in British Honduras, Costa Rica, Guatemala, Honduras, Libya and the Philippines. Most of these setbacks have been due to insufficiently stringent criteria for the termination of spraying and inadequate surveillance staff for case detection activities.

In some areas lack of adequate financial provision or political insecurity have proved serious obstacles. In others (defined as "problem areas"), transmission has persisted in spite of regular total coverage with residual insecticides. It is believed however, that the technical problems could be overcome if the necessary financial resources were available and administrative efficiency improved.

Residual spraying with DDT is still the principal weapon used, but the present trend favors a combination of spraying with mass drug administration in certain circumstances. The use of drugs in the attack phase to supplement residual spraying is now recognized to play a definite part in shortening the duration of this phase. In Haiti, mass administration of chloroquine combined with pyrimethamine at intervals of 3 weeks to a population of over 1 million was employed as the main attack measure. Some success has been claimed from the use of medicated salt in certain special situations, e.g., in British Guiana and among the nomads of Iran.

The need for frequent appraisal of the campaigns and their reorientation where necessary to meet changing requirements is increasingly recognized, and in 1965 independent assessment teams were used for this purpose in Brazil, Ecuador, Haiti, Honduras, India, Mauritius, Nepal, Peru, and Zanzibar. In the Indian program, independent assessment is an annual feature, designed to gauge the situation in areas proposed for the consolidation or maintenance phase. It is emphasized that in countries where successful eradication programs have preceded the development of comprehensive rural health services, it is important that the malaria eradication service should be used to strengthen the general health service.

Separate sections of the report are devoted to the organization and conduct of pre-eradication programs, the training of national malaria eradication staff, the promotion of technical methodology and coordination, and the protection of areas freed from malaria.

The factors responsible for the existence of the "problem areas" alluded to above are mostly related either to insecticide resistance on the part of the mosquito vector or to extra-domiciliary transmission with the vector feeding or resting out of doors. Other factors are migration of people from sprayed areas, the habit of sleeping out of doors during the transmission period, the building of new houses and interference with sprayed surfaces.

Instances of apparent resistance of parasites, mainly *Plasmodium falciparum*, to 4-aminoquinino-

lines have been reported from some countries of Southeast Asia: Cambodia, northern Malaya, Thailand and Viet Nam; from the Americas: Brazil, Colombia, Venezuela; and from Africa: Ghana, Liberia and Upper Volta. Most of these observations are of a limited number of cases and many have remained unconfirmed. There are, however, reports from the United States of an increase of chloroquine-resistant *P. falciparum* infections in Viet Nam.

In the World Health Organization research program increased attention has been given to problems of epidemiology, the resistance of parasites to drugs, the behaviour of vectors in natural conditions and in dwellings treated with insecticides, and the further development of attack measures, including the employment of larvicides and biological control.

An important result in the field of chemotherapy has been the development of an injectable repository antimalarial drug, cycloguanil pamoate. This may be of value as a long acting prophylactic agent, since a single intramuscular injection is likely to provide protection for at least one month in areas where the parasite is not already resistant to pyrimethamine. A pyrocatechol derivative, known as RC 12, is to undergo tests to determine whether this can be used for the radical cure of *P. vivax* infections and whether it presents any advantage over primaquine. A number of long acting sulphonamides and sulphones have also recently been tested against human malaria, but none of these appears to be equal or superior to chloroquine as an antimalarial.

ANAPHYLAXIS

Pfizer Spectrum 14(4): 74, 75, 76, 87, Fall 1966.

Anaphylaxis is the acute, immediate, severe and sometimes fatal reaction occurring within seconds or minutes after exposure to (sometimes a minute amount of) an allergenic agent to which the patient is specifically hypersensitive. Reaction may follow oral or inhalant administration, but is more common after injection, either by insect or therapist. The great majority of such reactions are iatrogenic, following diagnostic or therapeutic procedures. Anaphylactic reactions are characterized by generalized urticaria, angioedema, rhinitis, conjunctival congestion, wheezing dyspnea, shock, or any combination of these manifestations.

Anaphylactoid reactions are clinically indistinguishable from anaphylaxis, but occur in nonallergic patients, following administration of substances that are primarily toxic. . . . While persons may vary in susceptibility to toxic substances, no immunologic mechanism can be demonstrated.

Serum sickness or the serum sickness-like reaction . . . is characterized by fever, rash, adenopathy, edema, arthralgia with or without arthritis, neuropathy, and leukopenia usually with lymphocytosis . . . singly or in combination. The underlying mechanism of serum sickness is similar to that of anaphylaxis. Clinically, however, it is different in that its incuba-

tion period is five to ten days, and fever, adenopathy and joint symptoms are prominent, while there is neither asthma nor shock. (Murray Dworetzky in *Current Therapy*, edited by H. F. Conn, Philadelphia, W. B. Saunders Co., 1963, p. 387.)

Although more is being learned about the mechanism and treatment of anaphylactic reactions, morbidity and mortality from them are on the increase. When anaphylaxis was first described and named in 1902, its mechanism was not understood because the reaction between antigens and antibodies was not understood. The chief recognized causes were diphtheria antitoxin and insect bites. Diphtheria antitoxin is of little use now and the incidence of insect bites has probably not changed much, but widespread administration of penicillin, allergenic extracts, contrast media and vaccines has turned anaphylactic and anaphylactoid reactions into an important cause of illness and death.

Anaphylactic and atopic reactions are essentially the same, but it is usual to identify atopy with asthma, eczema, allergic rhinitis and urticaria, and anaphylaxis with sudden shock and serious forms of edema, nearly always from injection of foreign material. In either case an antigen has led to the formation of an antibody, and subsequent exposure precipitates the reaction.

Anaphylactoid is a term that has progressed through a number of definitions. Selye applied it to the hyperemia, pruritus and edema developing in rats after injection of egg white or dextran. Today it is commonly used to describe a reaction indistinguishable from anaphylaxis but without the presence of antibodies, or the reaction brought on by administration of toxic doses much larger than the minimal amount that can produce anaphylaxis. One bee sting can produce fatal anaphylaxis in a sensitized person, and it may take a 100 or more to produce fatal anaphylactoid shock in an unsensitized person. One hardy individual survived 2,243 stings, though not without severe anaphylactoid reactions. The distinction between the two terms is a useful one but they are unfortunately used interchangeably by many authors. Some authors claim that hypersensitivity can exist without previous sensitization, but in the cases on which they base their hypothesis it is far more likely that antibodies have been generated by unknown or forgotten contact with the substance in question, or with a related substance.

Anaphylaxis is expressed in various systems, all involving smooth muscle; the system affected varies with the animal species. In dogs the hepatic venules are the principal target organs, with spastic obstruc-

tion and portal hypertension resulting in shock; in guinea pigs the bronchioles are constricted, and the animals die in asphyxia and shock; in rabbits pulmonary arterial spasm obstructs the pulmonary circulation, causing right ventricular distention and shock. Man is more versatile, as he can have any or all of these reactions, plus urticaria, edema of the upper respiratory tract, angioneurotic edema and rhinitis. Most deaths are due to shock or respiratory failure, sometimes with edematous obstruction of the glottis.

Sudden death in infancy is sometimes associated with glomerular lesions similar to those observed in certain experimental studies. As the lesions contain proteinaceous material, it is postulated that they are caused by a physiologic defect resulting in absorption of undigested allergenic substances, as from cow's milk. Pulmonary edema is another finding in deaths of this type.

Serum sickness is closely related to anaphylaxis. It comes on 4 to 10 days after administration of a large dose or repeated small doses of heterologous serum or certain drugs. Enough of the foreign substance remains to act as a challenging dose after antibodies have been formed. It is characterized by adenopathy, arthralgia, fever, leukopenia, neuropathy and rash. When the material is injected, the reaction is usually preceded or followed by pruritus, macules, wheals and erythema at the site of injection.

It is generally accepted that endogenous histamine is important if not essential to anaphylaxis. Union of antigen and antibody seems to activate mast cells, causing an enzyme they contain to release histamine. This induces increased capillary and tissue permeability and other types of vagotonic reaction. Histamine appears to be responsible for many of the effects of anaphylaxis, although pulmonary mast cells are so poor in histamine that bronchospasm is thought to be an exception. It seems to result from release of a "slow reacting substance" (SRS-A), which is also contained in mast cells. Experiments with certain animals show that serotonin also plays a part, but human mast cells contain little of it.

Antihistamines are effective in counteracting the reaction because they compete with histamine at the cell level and decrease capillary permeability. The reaction is mitigated by thiouracil, alloxan, ACTH, corticosteroids and epinephrine, and aggravated by thyrotropin and insulin.

It is suspected that the serum level of bradykinin may have some influence—it appears to be impor-

tant in rats but not in dogs. Acetylcholine has been incriminated, if for no other reason than that its toxicity is counteracted by epinephrine and the diabetic state.

Almost any organic material can cause it. The multiplicity and variety of sensitizing substances are astonishing. Proteins come first to mind, with horse antiserum one of the worst offenders. Hormones (insulin, corticotropin, relaxin), enzymes (trypsin, chymotrypsin, penicillinase), hymenoptera stings, pollens (ragweed, Bermuda grass), many foods (egg white, shellfish, cottonseed oil, chocolate, buckwheat, certain fruits and vegetables), glue, guinea pig hemoglobin used for skin testing, and many other proteins have caused serious reactions and sometimes death. One patient who showed no evidence of atopy and who had presumably never been exposed to horse serum, reacted alarmingly to an intradermal test for sensitivity to tetanus antitoxin. It can be assumed that he had had some contact with horse dander. People have gone into shock from eating small amounts of mango or beet. Injection of a few drops of chymotrypsin into the eye induced collapse even though the patient was being treated concurrently with a corticosteroid. Corticotropin might be expected to have a deterrent effect on anaphylaxis, yet it has seemed to be the cause in about 100 cases.

There are far more deaths from insect stings than from snakebite. A man stung by two bees while mowing his lawn died in 20 minutes. It was thought that he had been sensitized by a bee sting 20 years earlier; if he had had interim exposure to bee venom, it had been forgotten.

Polysaccharides constitute a less important class of offenders. Acacia is no longer prescribed as a medicament but it is still used as an emulsifier. Dextran is an efficient plasma expander and is prescribed as the iron-dextran complex for parenteral treatment of anemia. Many people are sensitized to it by dextran occurring as a contaminant of dextrose in the sugar bowl or produced by normal intestinal flora.

Then there is the highly diverse group of the hap- tens, which become allergenic by combining with body proteins. Penicillin is the most notable example, and a single tablet can be fatal in a sensitized individual. One of two jailed suspects complained of a sore throat and his well-intentioned accomplice gave him a penicillin tablet. The victim almost immediately became dyspneic, with sweating and vomiting, and died in a matter of minutes. A physician who collapsed after drinking a glass of milk

from penicillin-treated cows, has learned that a sip of such milk taken on his tongue causes tingling if it contains penicillin.

It has been claimed that semisynthetic penicillins can be tolerated by penicillin-sensitive patients, but this is an extremely dangerous assumption; cross sensitivity is a distinct possibility. It is also possible that dermatophytes induce cross sensitivity, as some of these fungi produce penicillin-like substances.

Death has followed oral treatment of tuberculosis with PAS in patients who have become sensitized, but it can usually be forestalled by prompt administration of epinephrine. Antihistamines are often given in conjunction with epinephrine, although they cannot possibly act in time to mitigate an overwhelming reaction. Paradoxically, sensitization to an antihistamine has occurred in isolated instances, and a challenging dose has produced anaphylaxis by releasing histamine in toxic amounts, rather than combating its effects as it was expected to do. A case of shock precipitated by probenecid was initially diagnosed as myocardial infarction. Recovery was slow with symptomatic treatment dictated by this diagnosis, but a similar episode caused by a challenging dose of the drug some weeks later responded rapidly to specific antiallergic therapy.

Though rare, death from local anesthetics has been known to occur in the dentist's chair or the physician's office. A single drop in the conjunctival sac proved fatal in one case. Because they are so widely used, dyes occupy a prominent place on the danger list, although the incidence of sensitization is comparatively low. There has been at least one fatal reaction to sulfobromophthalein and one to triphenylmethane injected to determine the depth of a burn. In the latter case it was a question of cross sensitivity induced by phenolsulfonphthalein or sulfobromophthalein, which had been previously injected for diagnosis. Contrast media have also been implicated, most frequently in intravenous cholangiography, whereas oral cholangiography appears to be considerably safer. Anaphylactoid, toxic reactions to intravenous urography are not uncommon, and true immunologic, anaphylactic reactions are also known to have occurred.

Prevention may fail—treatment must be prompt. Observance of a few simple rules can greatly reduce the risk of anaphylaxis. Patients should be questioned as to whether they have ever had even mild reactions to any drug. Parenteral medication should be reserved for those cases in which oral medication

is not possible or practical, and the need should be weighed against the risk of sensitization or immediate anaphylaxis. Injection sites should preferably be selected so that a tourniquet can be applied proximally if there are signs of systemic reaction. Though oral administration is much safer than parenteral, in some people who are subject to allergic disease, penicillin—or any other drug to which they are sensitive—can still be dangerous by mouth or by inhalation. Desensitization to penicillin is possible but undependable, and testing for penicillin sensitivity can be as risky as outright administration of a therapeutic dose. If testing is considered necessary, a scratch test with penicillin G may reveal the serious reactors, but a greater number of mild reactors will show up in tests with penicilloyl-polylysine, which has the added advantage of being less prone to set off a systemic reaction. However, false negatives and false positives can occur, and anaphylaxis has been reported following the test.

Even a skin test may in itself be enough to induce sensitivity or set off a full-fledged anaphylactic reaction. When antiserum must be administered to sensitive patients who have unfortunately not been actively immunized with toxoid, it is best to use a human source rather than horse or bovine serum. The unit cost is comparatively high, but the effective dose is much lower.

When premonitory signs of anaphylaxis appear (erythema, swelling, itching), antihistamine should be injected immediately; if the reaction is purely local, no other medication may be needed. But if systemic effects follow (rhinitis, dyspnea, apprehension, etc.), 0.25 ml. of epinephrine 1:1000 should be given at the injection site. This dose should be repeated in another site every five or ten minutes until it causes nervousness or tachycardia. In impending shock it is customary to give corticosteroids by intravenous injection, although there is no real evidence that they have a beneficial effect. If signs of shock are progressive or persistent, levarterenol should be given by intravenous drip in glucose or

saline. An antihistamine is usually added; it cannot act quickly enough to combat manifestations that have already developed, but it may curtail further developments.

Aminophylline is indicated to overcome signs of asthma, 0.25 to 0.5 Gm. by slow intravenous drip. Oxygen by intermittent positive pressure may be required in anoxia. Emergency tracheostomy is imperative when edema of the glottis causes complete obstruction. External cardiac massage must be performed if arrest occurs (see *Spectrum* for Spring 1966, p. 32).

Any of the drugs producing anaphylaxis can also cause the serum sickness-like reaction in a person not previously sensitized. It is entirely unpredictable at present, as no test yet discovered can identify patients who will be subject to it, and it is accordingly unavoidable in many cases. Since the condition lacks the violence of anaphylaxis, symptomatic treatment may be adequate. Analgesics are given for joint and muscle pain, an antihistamine will tend to alleviate toxic reactions, and corticosteroids are useful to prevent liberation of acetylcholine. It must be remembered that a person who has experienced serum sickness is sensitized to the drug responsible for it. In the case of tetanus antitoxin, for example, an edematous arthralgia was misdiagnosed as being due to trauma, and further injection of antitoxin proved fatal.

Not only the incidence but also the mechanisms of anaphylaxis might become better known if death certificates were more completely filled out and more carefully reviewed. Drugs administered in the period immediately preceding death are often not indicated. Such omissions deprived researchers of valuable information.

Medical progress and the multiplication of life-saving drugs have conferred inestimable benefits but they are unfortunately attended with new dangers. Anaphylaxis is one of the worst. The physician must be ever on the alert to prevent its occurrence and must be prepared, with an emergency tray always at hand, to combat it.

KNOW YOUR WORLD

Did You Know?

That 24 cases (1 fatality) of melioidosis have been reported among U.S. forces in South Viet Nam in 1966?

This has been heretofore classified as a rare and sporadic disease in man and there is lack of information on the incidence among the Vietnamese. (1)

That 1,057 cases of measles were reported for every death from the disease in Northern America in 1963-64, 7 cases per death for Middle America and 21 cases per death for South America?

The case-fatality rate for measles is excessively high in some Latin American countries with a constant annual increase over the past decade in these countries. (2)

That development of a live virus vaccine against mumps was reported at an International Conference on Vaccines, sponsored by the WHO and the Pan-American Health Organization?

Tests among 3,000 children have demonstrated the American vaccine effective and safe and it is expected that the U.S. Public Health Service will be able to license the product sometime in 1967. A report of the live virus vaccine used in the USSR, supposedly markedly reduced the rate of mumps infections in schools and cities where used. (3)

That the Chinese Health Administration reported 1 imported case of Cholera in Taipei, Taiwan, on 14 March 1967?

A 52-year old male Vietnamese arrived from Saigon by commercial aircraft on 11 March; onset of disease was the morning of 12 March, he was hospitalized that afternoon and laboratory confirmation of cholera was obtained 24 hours later on 13 March.

The last case of cholera reported in Taiwan was on 8 August 1963, in a 35-year old female who was a passenger on a ship from Hong Kong, which at that time was a cholera infected local area.

It is to be noted that according to the provisions of the WHO International Sanitary Regulations, health administrations have not the right to consider Taipei as a cholera-infected local area, on account of this imported case. (4)

That the United States 1966 birth rate of 18.5 births per 1,000 population continued to decline from the most recent peak of 25.3 in 1957 and was the lowest rate since 1936? (5)

That 7 outbreaks of botulism resulting in 13 cases were reported from 5 states in 1966 to the National Communicable Disease Center, Atlanta?

Confirmation was obtained in 9 cases by demonstration of botulinum toxin. Most unusual outbreak was in California where botulinum toxin, presumptively type F, was isolated from venison jerky, this being the second type F outbreak recorded. In 1963, highest reported since 1939, represents 46 cases from 12 outbreaks, with 22 involving type E botulism related to the consumption of commercially prepared smoked fish. (6)

That the State of Guyana (former British Guiana) has become a Member of the WHO?

This brings the number of Member States of the WHO up to 124; there are also 3 Associate Members. (7)

That parathion, generally considered to decompose rapidly after application, can persist to become a water contaminant?

Although reports have been few, the insecticide was recovered from several of a Florida city's water supply wells in July 1962 and January 1963, "demonstrating at least under local soil conditions that parathion is capable of contaminating ground water." (8)

That the U.S. Administrative International Development Mission to India at the National Institute of Communicable Diseases in Delhi, reports that several attempts to solve the problem of unproductive cattle in India for the past 20 years remains without success?

There is some research now which includes bovine sterilization. (9)

That the U.S. may expect 5,000 deaths a year from motorcycle accidents?

From 1962-65, the use of motorcycles has doubled and the increase is much accelerated. On a ve-

hicle-mile basis, the chance of a cyclist being killed is 20 times that of a car driver; the chance of the passenger being killed is greater than that of the driver; when motorcycles collide with autos, 97% of the casualties occur to the cyclist; and lastly, cyclists with less than 6 months' experience have an accident rate double that of the more experienced. (10)

References

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EDITOR'S SECTION

MEDICAL DEPARTMENT OFFICER CORRESPONDENCE COURSE "DECEDENT AFFAIRS"

The Medical Department correspondence course "Decedent Affairs," NavPers 10514, is now available for enrollment of all eligible officer and enlisted personnel of the Armed Forces. Applications for enrollment in this course should be submitted on Form NavPers 992 (with appropriate change in the "To" line), and forwarded via official channels to the Commanding Officer, Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014. Pertinent information applicable to this course is delineated below:

The course is based on the Bureau of Medicine and Surgery Instruction 5360.1. In context, this course is designed to provide a concise coverage of the duties and responsibilities of personnel concerned with care-of-the-dead procedures. Specifically, the course highlights pertinent aspects related to search, recovery, identification, preservation, and disposition of deceased persons for whom the Department of the Navy is responsible.

The course is comprised of two (2) objective-type assignments containing seventy-five questions each and is evaluated at four (4) Naval Reserve retirement points. These points are creditable only to personnel eligible to receive them under current directives governing retirement of Naval Reserve personnel.—CO, NNMC, Bethesda, Md.

SCIENTIFIC MEETING

An unclassified Symposium on Post Irradiation Recovery Kinetics will be conducted by the Armed Forces Radiobiology Research Institute (AFRRI) on 8 and 9 June 1967 in Bethesda, Maryland, U.S.A.

Invited papers on Mammalian Recovery, Residual Injury, and Late Effects will be presented. Persons interested in attending the AFRRI Symposium are requested to contact Dr. S. J. Baum, AFRRI, before 15 May 1967. Non U.S. citizens must indicate their nationality.—AFRRI, Bethesda, Md.

PATHOLOGY OF LABORATORY ANIMALS

The annual Armed Forces Institute of Pathology short course, "Pathology of Laboratory Animals", will be held at the Institute September 18-22, 1967.

In announcing the course, AFIP Director Major General Joe M. Blumberg MC USA, said that it will provide training for those responsible for the recognition and interpretation of lesions in experimental animals. It is intended particularly to help interpret natural diseases which may negate experimental results, or influence the supply of laboratory animals or their suitability for experimental use.

"Pathology will be the theme of the course," Gen Blumberg stated, "but this facet will be used as a point of departure for discussion of etiology, diagnosis, and control of the diseases under consideration. Military and civilian laboratory officers, veterinarians, and others with similar professional backgrounds should find the course of value."

The course is open to military veterinary, medical and dental officers and on space available to qualified civilian veterinary, medical and dental personnel.

Additional information may be obtained by writing: The Director, Armed Forces Institute of Pathology, Washington, D.C. 20305, ATTN: Department of Pathology. *Applications can not be considered after August 1, 1967.*—AFIP, Washington, D.C.

DR. SABISTON VISITS NAVAL HOSPITAL

On January 6th and 7th, 1967, Dr. David C. Sabiston, Professor of Surgery and Chairman of the Department of Surgery at Duke University School of Medicine, visited the Portsmouth Naval Hospital in conjunction with the Visiting Professors Program. The visit began with luncheon at the Naval Shipyard Officers' Club with members of the Surgical Service. Dr. Sabiston then participated in the Medical-Surgical Chest Conference, and later conducted Grand Rounds Discussions on cases from the General Surgical Service.

At the monthly hospital staff conference, Dr. Sabiston delivered a lecture on "Pulmonary Embolism", a subject in which he has had considerable experience, both in the experimental and clinical fields. The first part of the lecture dealt with the pathophysiology of pulmonary embolism. Lantern slides and a cinematography were used demonstrating that, if the subject survives, the embolus will gradually resolve and the pulmonary artery will become recanalized. The speaker pointed out that in individuals without underlying pulmonary disease as much as one-half of the pulmonary circulation may be occluded without causing serious symptoms. However, with underlying pulmonary problems such as emphysema, pulmonary fibrosis, etc., it may take considerably less than one-half the pulmonary circulation to be occluded in order to cause serious symptoms.

Dr. Sabiston then discussed some of the difficulties in diagnosis. He pointed out that the chest x-ray is often normal. He then demonstrated some of the experimental work which led to the development of the radioactive pulmonary scan using a specially prepared I_{131} tagged human serum albumin.

The speaker then discussed the treatment of pulmonary embolism in three categories. In the first and largest group are those who respond to anticoagulation. The next group consists of those patients with continuing embolization who require vena cava ligation or ligation. In the final group are the small number of patients with massive pulmonary emboli who require pulmonary embolectomy. This latter group also undergo vena cava interruption at the time of embolectomy. Cardiopulmonary bypass is ordinarily used for pulmonary embolectomy although some cases have been done without this adjunct.

Dr. Sabiston concluded his lecture with a review of the experience with pulmonary embolectomy at

the Duke University Medical Center. Seven embolectomies have been performed, in five of whom the diagnosis had been made preoperatively by pulmonary scan; four of these survived. The other two patients had a diagnosis established on clinical grounds and were later found to have myocardial infarction rather than pulmonary embolus; both patients died. He emphasized the importance of making an accurate diagnosis before subjecting the patient to pulmonary embolectomy.

On Saturday morning, Dr. Sabiston discussed a paper presented by Dr. David H. Lewis, a third year general surgery resident, entitled "Anatomy of Radical and Supra-radical Mastectomy with Correlations to Operative Case Selection." This was followed by a Grand Rounds Discussion of selected surgical cases including: a patient with liposarcoma of the thigh, another with chronic pancreatitis, and two other cases included a stress ulcer and a liver abscess.

The Visiting Professors Program has been well received at this hospital benefiting both the resident as well as the regular staff. Removed from the close environs of a university medical center complex, this type of program provides the Portsmouth Naval Hospital the academic atmosphere so vitally necessary to maintain its high standards of training. Similar programs are planned for the future.—Naval Hospital, Portsmouth, Va.

WET SUIT FOR NAVAL AVIATORS

A program has been initiated at the Naval Aerospace Crew Equipment Laboratory, Naval Air Engineering Center, Philadelphia, Pennsylvania, to adapt the skin diver's wet suit for certain cold weather sea survival situations. The suits are one piece and consist of cellular neoprene with a neoprene skin surface and nylon lining. Since the radius of operations of carrier based aircraft often places Navy pilots in radically opposite environmental conditions, it becomes necessary to provide ventilation for any impermeable suit assembly worn. The engineering problem of providing ventilation to the wet suit configuration, with adequate distribution to the extremities is complicated due to the fact that these suit assemblies must be relatively form fitting to be effective as an exposure garment. This problem has been solved by using controlled orifice ventilation channeling coupled with the strategic location of carefully selected spacer materials.—Public Affairs Office, BuMed.

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